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AUTHOR Mensch, Barbara S.; Kandel, Denise B.
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ABSTRACT

The relationship between dropping out of high school and substance use was explored using the 1984 National Longitudinal Survey of Young Adults. Relevant research literature is reviewed. Cross-sectional data indicated that high school dropouts were more involved with cigarettes and illicit drugs than were graduates and that those who obtained a graduate equivalency diploma were the most intensively involved. Event history analysis indicated that prior use of cigarettes, marijuana, and other illicit drugs increases the propensity to drop out and that the earlier the initiation into drugs, the greater the probability of premature school leaving. Thus, preventing or at least delaying the initiation of drug use will reduce the incidence of dropping out of high school. These findings have broad implications for the development of intervention strategies for at risk students. Statistical data are presented on seven tables. A list of 58 references is included. (VM)

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Barbara S. Mensch and Denise B. Kandel

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DROPPING OUT OF HIGH SCHOOL AND DRUG INVOLVEMENT

BARBARA S. MENSCH AND DENISE B. KANDEL
Columbia University

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The relationship between dropping out of high school and substance use was explored using the National Longitudinal Survey of Young Adults, a national longitudinal sample of young Americans aged 19–27 in 1984. Cross-sectional data indicated that high school dropouts were more involved with cigarettes and illicit drugs than were graduates and that those who obtained a graduate equivalency diploma were the most intensely involved. Event-history analysis indicates that, controlling for other important risk factors, prior use of cigarettes, marijuana, and other illicit drugs increases the propensity to drop out and that the earlier the initiation into drugs, the greater the probability of premature school leaving. Thus, preventing or at least delaying the initiation of drug use will reduce the incidence of dropping out from our nation's high schools.

The failure to complete high school has severe consequences for the individuals involved as well as for the society that depends on increasingly educated and skilled citizens to perform the various tasks required for its functioning. Young people who drop out of high school have a much greater probability of experiencing unemployment (Feldstein and Ellwood 1982) and much lower earnings over the life course than those who graduate (Morgan 1984). Dropping out of school is a major problem, especially in large metropolitan school systems (Hammack 1986).

To date, there have been few national studies on school dropouts—except for Barro and Kolstad 1987; Coleman and Hoffer 1987; Pallas 1984; Rumberger 1983, the first three based on the same data set from High School and Beyond (HSB, National Center for Education Statistics [NCES] 1984). There have been even fewer studies of the potential differences between terminal dropouts and young people who drop out of school but subsequently obtain a high school equivalency certificate. In particular, no studies have considered the interrelationship between dropping out of school and drug use. This omission is all the more surprising since the use of drugs, especially marijuana and other illicit drugs, has increased dramatically over the past two decades (Johnston, O'Malley, and Bachman 1986; Kandel 1980) and the effects of drugs on young people is a source of major societal concern. The potential effects of drug use on leaving school remain to be established.

This article reports on a study of the relationship between substance use and failure to complete high school that addressed three major issues. First, are the use of drugs and dropping out of school related to each other? Second, does drug use have a unique effect on and is it a predisposing factor for dropping out of school? That is, controlling for individual attributes, such as intellectual ability or socioeconomic status (SES), does the prior use of licit and illicit substances contribute uniquely to early school leaving? Or do drug use and dropping out share a common set of risk factors, so that the effect of drug use on dropping out disappears once these common antecedents are held constant? Finally, do dropouts who eventually acquire an equivalency certificate have different histories of drug use than those with no high school diploma? The data are from a nationally representative sample of young Americans from the National Longitudinal Survey of Youth (NLSY), an ongoing survey of over 12,000 young people who were aged 14–21 when first interviewed in 1979 and who have been interviewed annually since then.

THE LITERATURE

Who Drops Out?

To place the potential role of drug use on dropping out of school in perspective, it is

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useful to review the findings of research on the determinants of dropping out of high school. In a comprehensive review, Pallas (1984) classified individual characteristics other than SES that are associated with dropping out of school into three groups: academic performance, "social disability" (poor social and interpersonal skills, delinquent behavior), and "accelerated role transitions" (the early assumption of such adult roles as worker, spouse, or parent).

Both high school grades and academic ability, as measured by standardized tests, as well as negative attitudes about school and teachers are consistently strong predictors of dropping out of high school (Bachman, Green, and Wirtanen 1971; Barro and Kolstad 1987; Coleman and Hoffer 1987; Combs and Cooley 1968; Ekstrom et al. 1986; Howell and Frese 1982b; Pallas 1984; Peng and Takai 1983; Ruby and Law 1983; Sewell, Palmo, and Manni, 1981).

By and large, the personality variables that have been measured are not the most important predictors of premature school leaving. Personality predictors of dropping out include low educational and professional aspirations and a low commitment to conventional goals (Gottfredson 1982; Rumberger 1983), as well as low psychological well-being, as reflected in high levels of anxiety, depression, resentfulness, and irritability (Gottfredson 1982). Self-esteem and sociability or social adjustment, however, are not significant in multivariate models (Gottfredson 1982; Howell and Frese 1982b; Pallas 1984), and inconsistent results have been reported with respect to locus of control (Ekstrom et al., 1986; Rumberger 1983; Pallas 1984).

Behaviors that reflect a strong attachment to peers—especially the lack of conventionality and attachment to social institutions, such as delinquency, including disciplinary problems in school or school suspension and probation—and low religiosity strongly predict early school leaving (Bachman, Green, and Wirtanen 1971; Barro and Kolstad 1987; Coleman and Hoffer 1987; Elliott and Voss 1974). However, delinquency and dropping out may share a common set of school-related determinants, such as academic failure, truancy, and rebelliousness (Elliott and Voss 1974). Dating is also positively related to early school leaving (Combs and Cooley 1968; Pallas 1984). Dating behavior, like delinquency, may provide an indirect indication both of the degree to which time is spent on nonacademic activities and of an orientation to peers rather than to parents.

The argument that the early assumption of adult roles reduces the commitment to schooling has had considerable empirical support. The most consistent finding—one that has been documented with the NLS youth cohort (Mott and Marsiglio 1985), as well as with other survey data (Barro and Kolstad 1987; Howell and Frese 1982a, 1982b; Pallas 1984; Rumberger 1983)—is that the risk of early school leaving among girls is much greater for those who become parents than for those who remain childless during adolescence. Net of childbearing, early marriage also raises the risk of leaving school before graduation, although the effect is not as large as it is for teenage parenting (Pallas 1984).

The consequences of work during high school for the completion of education depend, in part, on the sample and the nature of the employment. In one study, based on the NLS youth cohort up to 1982, part-time work (less than 20 hours per week) reduced the likelihood of dropping out for high school juniors, except minority males (D'Amico 1984). However, an analysis that controlled for such potentially confounding effects as cognitive ability, in-school delinquency, personality traits, and dating behavior, using data from HSB, indicated that part-time work may be detrimental for boys (Pallas 1984). In both the NLSY and the HSB samples, the effect on high school completion of more intensive employment (greater than 20 hours per week in the NLSY or greater than 14 hours in the HSB, or working full time in HSB) generally has been negative (D'Amico 1984; Barro and Kolstad 1987; Pallas 1984).

In addition to academic performance, the lack of social attachment, and early entry into adult roles, background variables are significant predictors of dropping out, even controlling for other factors. Parental education, income, and occupation are the most important factors even when more proximate characteristics of adolescents are included, such as academic ability and performance, educational aspirations, childbearing, and delinquency (Coleman and Hoffer 1987; Howell and Frese 1982b; Pallas 1984). There is some evidence that the education of the same-sex parent is the most influential, although for black males, the mother's

education is slightly more important (Rumberger 1983). In pooled samples, the mother's education is a better predictor of early school leaving than is the father's (Howell and Frese 1982b). Although blacks are more likely than whites to drop out of school, controlling for other background variables, minorities are as likely (and, in some instances, significantly more likely) to complete high school than are whites (Howell and Frese 1982b; Pallas 1984; Rumberger 1983). The higher dropout rates observed among blacks or Hispanics than among whites appear to be due to their lower socioeconomic resources.

The research on dropping out of school has focused, for the most part, on individual factors, even though structural factors have also been examined (Coleman and Hoffer 1987; Felice 1981; Fine and Rosenberg 1983; Hill 1975; Olsen and Edwards 1982; Papagiannis, Bickel, and Fuller 1983; Wehlage and Rutter 1986). That individual factors alone do not account for school leaving was documented by Coleman and Hoffer's (1987) analysis of the differential dropout rates in public and private Catholic schools, which stressed the importance of the community in reinforcing academic norms and sustaining a child's schooling. Structural factors were not considered in our research, however.

Who Receives an Equivalency Certificate?

The educational attainment literature often does not distinguish between those who receive a high school diploma and those who fail to graduate but subsequently obtain a high school or graduate equivalency certificate (GED); therefore, little is known about this group of high school graduates. In 1980, the GED Testing Service investigated the demographic characteristics, previous schooling, test preparation, and reading habits of examinees (Malizio and Whitney 1981), and a followup in 1981 investigated the examinees' educational and employment outcomes (Cervero 1983). To our knowledge, no studies have compared the characteristics of dropouts who pass the equivalency examination with terminal dropouts, except for Morgan (1984), who found that wage rates for GED holders were significantly lower than for diploma holders but higher than for terminal dropouts. The impression of the director of the GED Testing Service is that those who pass the examination are between terminal dropouts and high school graduates on most characteristics (Douglas Whitney, 1986, personal communication).

Dropping Out and Drug Use: A Syndrome?

Drug use can be expected to be related to school dropout, since both are manifestations of deviant "problem proneness" behavior (Jessor and Jessor 1977). Theoretical frameworks developed to account for such behaviors stress the impact of social contexts that are favorable to deviance and personality factors that reflect the lack of attachment to conventional values (Elliott, Huizinga, and Ageton 1985; Hirschi 1969; Jessor and Jessor 1977). Problem behavior theory (Jessor and Jessor 1977), in particular, postulates that deviant behaviors covary because adolescents who hold nonconforming attitudes and values and attempt to claim adult status are more likely to make the transition into a variety of deviant activities, such as smoking, the use of illicit drugs, drinking, precocious sexual activity, or delinquency, than are their more conforming peers. Abandoning the role of student would be another instance of problem behavior. However, although the different behaviors are generally assumed to be functionally equivalent for the adolescent, one or more may precede and constitute an increased risk factor for the others. Thus, the use of drugs and the failure to complete high school share many correlates and may be related either because of shared selection factors or because drug use increases the risk of leaving school.

Drug use and dropping out may be related because they share common antecedents. Adolescents who use drugs, especially marijuana and other illicit drugs, are characterized by many of the same attributes as are school dropouts, particularly less commitment and attachment to conventional values and institutions, such as the family and school, and lower psychological well-being. Adolescents who use drugs tend to have poorer relationships with their parents, stronger ties to their peers, poorer grades, more negative attitudes about school, and low self-esteem; in addition, they are more often absent from school, less religious, more depressed, more rebellious, and higher in risk-taking behavior and participate more frequently in delinquent activities (Brook, Whiteman, and Gordon

1983; Donovan and Jessor 1985; Jessor and Jessor 1977; Kandel 1980, 1982, 1984, 1986; Kaplan 1980; Kaplan, Martin, and Robbins 1984).

Alternatively, net of socioeconomic, behavioral, and personality variables, drug use may be a direct predictor of dropping out by lowering the adolescents' performance in school. Indeed, drug taking in and out of school detracts from actively participating in classroom activities, paying attention to the teacher, or spending time on homework, and may even impair cognitive functioning. In addition, not only is the initiation of adolescents into drug use influenced by their association with drug-using peers, but drug use may reinforce further membership in drug-using and deviant subcultures that support lack of attachment to and dropping out of school.

As noted earlier, we addressed several questions regarding the interrelationships between licit and illicit substance use and dropping out of high school in a large national sample of young Americans. We examined the cross-sectional associations between drug use and dropping out of high school and identified the role of drug use as a predictor of dropping out of high school and, having dropped out, obtaining a GED, relying on event-history analysis as a major statistical tool. Thus, we determined to what extent drug use contributes to dropping out of school, over and beyond the fact that both behaviors appear to share similar predictors.

METHODS

Sample and Data

Our analyses were based on the youth cohort sample of the NLSY, an ongoing multistage stratified area probability sample representative of individuals born in 1957–64 in the coterminous United States. Blacks ($n = 2,986$), Hispanics ($n = 1,959$), and economically disadvantaged white youths ($n = 1,929$) have been oversampled. Since 1979, respondents have been interviewed annually through personal household interviews. The completion rate for the base-year sample was nearly 90 percent. Retention rates have been consistently high; 95 percent of the original sample, 6,062 males and 6,009 females, were interviewed for Wave VI in 1984 when they were aged 19–27. In the base-year sample, weighting was adjusted for different sampling rates and differential completion rates among the various design cohorts: Hispanics, blacks, and economically disadvantaged whites. The sample design, as well as the high participation and completion rates, indicate that groups who are difficult to locate, including high school dropouts, are more likely to be included in the NLSY than in other national surveys.

Although originally designed as a study of the labor market experience of young people, the NLSY added a number of questions related to lifestyle and health in successive waves. Psychological variables were rarely measured and only in selected waves. Since 1982, respondents have been queried annually about their use of alcohol, sexual activity, and pregnancy and fertility histories. In 1984, a series of drug-related questions was included. Respondents were asked separate questions about cigarettes and marijuana. For illicit drugs other than marijuana and the nonmedical use of pills and tranquilizers, respondents were shown a card, read a list of drugs, and asked about their usage for each. Information on lifetime frequency, recency, frequency in the past month, and age at initiation were also obtained for each class of drugs.

Definition of a Dropout

We defined a dropout as any one whom we could determine interrupted his or her high school education at some point, including terminal dropouts, individuals who returned to school and obtained a high school diploma, and those who obtained a GED.[1] The educational histories in the NLSY are not complete for all members of the sample, however. In the first wave of the NLYS in 1979, respondents were questioned about

[1] The concept of school dropout is ambiguous. Various definitions have been used. One can be labeled a high school graduate even if one drops out and passes the GED exam, drops out and returns to get a diploma, or has been left back and graduates after the rest of one's birth cohort. Correspondingly, one can be labeled a high school dropout if one does not have a diploma or a GED at the time of a census or survey. Yet those who drop out but ultimately obtain a credential, those who drop out before the last year of compulsory attendance, and those who drop out late because they are simply not capable of finishing may be very different individuals (Bachman, Green, and Wirtanen 1971; Morgan 1984).

their educational attainment. Those no longer enrolled were asked when they were last enrolled and whether they had obtained a diploma or a GED. In subsequent waves, respondents were asked about their school attendance since the date of the last interview, reason for leaving school if they were currently not attending, and if and when they received a diploma or a GED. Because the NLSY never obtained complete educational histories prior to 1979 and did not ascertain the reasons for the respondents' subsequent nonattendance at school, certain individuals could not be counted as dropouts: those who had returned to school after dropping out and obtained a high school diploma before 1979, those currently enrolled in 1979 who had dropped out temporarily prior to 1979, and those currently enrolled at the date of any interview who had interrupted their schooling but subsequently returned since the previous interview. Furthermore, a dropout age could not be computed for 17.5 percent of those who obtained a GED because they did not provide the information or gave the date of passing the GED as their last date of enrollment in regular school.

Statistical Techniques

To specify the dynamic relationship between dropping out and drug use, we estimated discrete-time event-history models for dropping out and, among dropouts, for receiving a GED. Event history, which estimates the rate of occurrence of an event as a function of covariates, has a number of advantages over standard regression techniques. It can identify temporal relationships by the inclusion of time-varying independent variables, whose values do not remain fixed over the period of observation. Thus, we could specify whether drug use was initiated before the risk of dropping out at a particular age and, if so, what effect it had on dropping out. Event history can incorporate information on how the risk or hazard of the event varies by age. The probabilities of dropping out or of obtaining an equivalency certificate are not constant over age (GED Testing Service 1984; Morgan 1984). Finally, event-history models can take into account censoring when estimating the probability of an event. Since few individuals are in high school at age 19, the oldest age at which the youngest cohort in the NLSY was observed, censoring is not a problem for models of dropping out. It is, however, a factor in models of obtaining a GED because dropouts remain at risk of obtaining a GED throughout their lives, although only 26 percent of GED test takers are over age 30 and 10 percent are over age 40 (GED Testing Service 1984). Thus, an unknown number of dropouts in the NLSY will eventually acquire a GED.

Given that certain events, specifically drug initiation, are recorded in the NLSY data as having occurred at a particular year or age rather than at an exact date, discrete-time event-history methods were applied. Time was divided into intervals of one year from age 15 to age 18 for the dropout model and 17–22 for the GED model, the ages of greatest occurrence of the events in the NLSY sample.[2] The hazard $P(t)$, the dependent variable in event-history models, is the conditional probability that an individual has an event at time t (or age a), given that the individual is at risk at that time or age. Although the discrete-time model here does not assume a particular parametric form for the hazard, it assumes a constant hazard within a specified time interval. It has been demonstrated that discrete-time hazard models can be estimated using programs designed for logistic regression (Allison 1982, 1984). The model is expressed as

$$\log (P(t))/(1 - P(t)) = a + \beta X,$$

where $\log (P(t))/(1 - P(t))$ = the logit of the hazard, and X = the set of explanatory variables. The coefficients give the change in the log odds for a unit change in the explanatory variables (Allison 1982, 1984). We used the logistic regression procedure from BMDP (1983).

Because hazard models are based on person-periods of exposure, rather than on the number of observations, the sample size increases greatly. A dropout contributes one observation for each year until the time of dropping out, but a nondropout contributes one observation for each year. Since the analysis of dropping out extended over 4 years, the NLSY sample of 12,069 was

[2] We included those who dropped out at age 14 or earlier, 5.8 percent of all dropouts, with those who dropped out at age 15 because creating a separate time interval for those who dropped out prior to age 15 would lead to small cell sizes.

expanded to a pooled sample of over 45,000 person years. The computational costs of running maximum likelihood models of that magnitude, in which iterative algorithms are used, are prohibitive. Therefore, we decided to reduce the person-year file by sampling the nondropouts at the rate of .30, a procedure that has been shown to provide unbiased coefficient estimates (Breslow et al. 1983; Cox and Oakes 1984). This sampling fraction resulted in a sufficiently large sample within acceptable computer costs (N = 3,271 men, 2,946 women). Since the costs of estimating logistic regression models remain high even after sampling 30 percent of nondropouts, we performed ordinary least-square analysis first to select reduced sets of covariates for the final logistic models, a cost-cutting strategy recommended by Allison (1984).

INDEPENDENT VARIABLES

Within the constraints of availability in the NLSY data set, the time-constant and time-varying independent variables included in the multivariate models of dropping out and obtaining a GED were selected because they are important correlates of problem behaviors in general, and dropping out and using drugs in particular. Furthermore, they index important dimensions of the theoretical frameworks developed to account for such behaviors. Thus, in addition to sociodemographic characteristics, measures of adult transitions, commitment and attachment to conventional institutions, delinquent participation, and psychological characteristics were included.

Sociodemographic Background Variables

The sociodemographic background variables were as follows:

- *Mother's education*—years completed by 1979—and *father's education*—years completed by 1979. Since information on parental education was missing for over 5 percent of the sample and those who failed to provide information may not be a random subsample, missing dummy variables were included for mother's and father's education.
- *Race/ethnicity*—black, Hispanic, and white.
- *Household structure at age 14*—the presence (nuclear) and absence (nonnuclear) of two biological parents.
- *Residence*—urban and rural—and *region*—Northeast, South, Northcentral, and West. The last two variables were measured in 1984 and not at the time of exposure to the risk of dropping out or of obtaining a GED. If there was much geographical mobility, the variables would be correlated with the disturbance term and their coefficients would be biased.

Adult Role Transitions and Deviant Behaviors

Sexuality. Two variables pertaining to sexual behavior and family roles were entered in the models: sexual intercourse and pregnancy.[3]

Sexual intercourse was included both as a continuous variable (age of first intercourse) and as a dummy variable (whether intercourse was initiated prior to the risk of dropping out or passing the GED exam). Both forms of the variable are quasi-time varying because they do not actually change over time, but their values are dependent on time. For those who initiated sex before a specific dropout or GED age, the age of first intercourse was entered in each period following initiation; those who initiated sex at or after a specified age during the risk period for dropping out or obtaining a GED, as well as those who had not initiated sex by the last interview, were given values equal to their age at each specified time. For example, in the dropout model, if an individual initiated sex at age 13, he or she was coded 13 for all four person years (15, 16, 17, and 18); if he or she initiated sex at age 16, he or she was coded 15 for person year 15 and 16 for each subsequent person year. If an individual did not initiate sex by age 18, he or she was coded 15 for person year 15, 16 for person year 16, and so on. This procedure was followed because having sex at or after the specified dropout age is irrelevant to a dynamic analysis predicting dropping out. *Pregnancy*—the age at the beginning of the first pregnancy—was mea-

[3] Although employment during high school has been shown to be an important predictor of dropping out (D'Amico 1984), we excluded it from the models because the analysis would have been restricted to the period 1979–84 of the survey, when respondents were 14–21 years, and would have excluded 46.7 percent of the dropouts. Indeed, since retrospective work histories were not obtained, information on employment during high school is available only for those enrolled from the last year preceding the 1979 survey (January 1978) until 1984—not for those who dropped out before 1978.

sured the same two ways as was sexual intercourse.

The sexual intercourse and pregnancy variables were included simultaneously for women to determine whether sexual intercourse, net of pregnancy, is related to dropping out. Once an adolescent has intercourse, attitudes toward school, parents, and other authority figures might be altered. If pregnancy were omitted from the model, the sexual intercourse variable would pick up some of the causal effect of pregnancy.

Initiation into drug use. As for the variables measuring sexuality, we defined two age-related variables: age of first use and whether the individual initiated use prior to the risk of dropping out or obtaining a GED. Four classes of drugs were examined: alcohol, cigarettes, marijuana, and other illicit drugs (including psychedelics, cocaine, inhalants, heroin, other narcotics and nonprescription amphetamines, barbiturates, and tranquilizers). The cigarette and illicit drug variables are based on data from the 1984 survey, and, since age at first drinking was not asked in 1984, the alcohol variables are based on the 1982 survey, by which time 92 percent of the respondents had already started drinking. Since information on the age at which they first started drinking was missing for 8 percent of the males and 13 percent of the females, a missing dummy was included. The wording of the question about the initial use of alcohol that was asked in 1982 was such that it is not clear for whom it was intended. Only those who did not provide an immediate answer to the question, "How old were you when you first started drinking?" were to be given the probe, "For example, having two or more drinks a week?" A cross-tabulation of answers to this question with one asked the subsequent year about the age at which the respondents first started to drink "at least once or twice a week" indicated that 73 percent of those who responded to the 1982 question had ever used alcohol at least once or twice a week by 1983. Thus, many light users of alcohol were coded as missing and are probably underrepresented in the two alcohol variables.

Delinquency. Delinquency was defined as the number of nondrug delinquent acts from among 17 reported in 1980 for the previous year, classified into none, 1–2, and 3 or more.[4]

Individual Attributes

Academic ability. Academic ability was measured by the sum of the number of correct responses for the arithmetic reasoning, word knowledge, and paragraph comprehension sections of the Armed Forces Qualification Test (AFQT) plus half the number for the numerical operations section of the Armed Service Vocational Aptitude Battery, administered in 1980. Scores can range from 0 to 105.

Personality characteristics. Locus of control, a composite of four paired items measured in 1979, was designated as personal control and considered to be close to Rotter's original definition of locus of control (Robinson and Shaver 1973). The scale ranges from one, very internal, to four, very external. *Self-esteem* is a composite of 10 items from the Rosenberg self-esteem battery, measured in 1980. The scale ranges from one, high self-esteem, to four, low self-esteem.

Several variables—delinquency, academic ability, locus of control, and self-esteem—were measured only once in the early waves of the study, not at the time each individual was exposed to the risk of dropping out or obtaining a GED. To the extent that these constructs are not stable over time or are influenced by the dependent event, the coefficients will be somewhat biased. As have others (for example, Mare 1980), we accepted some simultaneity bias. Because of this potential bias, however, we also tested the models on the small subsample of individuals who dropped out of school after 1980 at age 16 or older and who represented 13.8 percent of all dropouts.

Duration variables. Dummy age variables were included in each model to determine whether the probabilities of dropping out and

[4] Suspension and expulsion from school, two additional measures of delinquency, were omitted from the analysis. If included, the other explanatory variables would appear to have no effect on the probability of dropping out because the former are determined by the same variables that determine dropping out. In addition, suspension and expulsion histories are available only for those who left school by 1980. Subsequent suspensions and expulsions were recorded only when they were terminal events (the reasons for dropping out).

of obtaining a GED vary with age and to control for age-dependence effects. The categories were ages 15–18 for dropping out and 17–22 for obtaining a GED.

RESULTS

Dropping out of High School and Drug Use

This section discusses the descriptive data on dropping out of high school and drug use. It then presents the results of the dynamic longitudinal analyses.

By 1984, 22.3 percent of the NLSY sample (24.2 percent of the men and 20.4 percent of the women) had dropped out of high school at some point in their educational careers, although only 14.8 percent (16.1 percent of the men and 13.4 percent of the women) had no high school credentials. Since respondents were aged 19–27 in 1984, they presumably were no longer at risk of dropping out of high school. Of those who had dropped out, 5.1 percent of the 1,439 men and 7.3 percent of the 1,171 women obtained a high school diploma; 28.6 percent and 26.9 percent, respectively, passed the GED examination; and 66.4 percent and 65.8 percent, respectively, had no credential by 1984.

Table 1 presents the percentages of young people who dropped out, by sociodemographic characteristics, academic ability, and

Table 1. Dropout Prevalence, by Selected Characteristics, among Men and Women

Characteristic	Men		Women	
	Percentage	Number	Percentage	Number
Mother's education				
No Diploma	42***	1,674	36***	1,855
HS Diploma	17	2,690	13	2,488
Some College	9	1,223	7	1,144
Father's education				
No Diploma	37***	1,751	31***	1,776
HS Diploma	19	1,910	15	1,916
Some College	9	1,673	7	1,464
Race				
Hispanic	42***	362	39***	362
Black	34	806	26	798
White/Other	21	4,771	18	4,585
1984 residence				
Urban	24	5,012	20***	4,846
Rural	26	826	25	832
1984 region				
Northeast	20***	1,224	15***	1,118
Northcentral	20	1,630	17	1,576
South	29	1,898	23	1,989
West	26	1,105	25	1,003
Household structure at age 14				
2 biological parents	19***	1,486	15***	1,465
Other	41	4,442	36	4,274
1980 AFQT Score				
0–63	48***	1,890	42***	1,779
63.5–83	18	1,761	15	2,027
83.5–105	6	2,014	5	1,745
1980 delinquent acts				
None	16***	1,370	15***	2,460
1–2	20	1,887	21	2,004
3 or more	32	2,364	29	1,033
1980 self-esteem (1 = high, 4 = low)				
1.0–1.5	13***	1,920	11***	1,826
1.6–1.9	23	1,797	17	1,687
2.0–4.0	35	2,031	30	2,087
1979 locus of control (1 = very internal, 4 = very external)				
1.0–1.9	17***	2,146	12***	1,983
2.0–2.5	25	1,831	20	1,703
2.6–4.0	32	1,946	28	2,041

*** Differences among categories of variables significant at $p < .001$.

personality. As can be seen, low parental education, minority group status, nonintact household structure, low AFQT score, low self-esteem, and an external locus of control were strongly associated with dropping out.

For both sexes, the lifetime and annual prevalence of the use of various legal and illegal substances and the intensity of use were higher, with the exception of alcohol, among those who dropped out of high school than among those who did not (see Tables 2 and 3). Among men, the lifetime use of cigarettes was 1.2 times higher; of marijuana, 1.1 times higher; and of cocaine, 1.3 times higher for dropouts than for nondropouts. Among women, the corresponding ratios were 1.1, 1.1, and 1.4. Furthermore, differences between the groups were stronger with respect to the degree of involvement than with respect to any lifetime use of the drugs. Substance use among nondropouts, whether cigarettes, marijuana, cocaine, or other illicit substances, was more likely to be experimental than it was among dropouts.

Important differences were observed among the dropouts. Those who passed the GED examination were *most* likely to have used drugs. The terminal dropouts were not particularly heavy users; among females, the prevalence rates for illegal substances were only slightly higher than those among high school graduates. Whereas the characteristics of those who passed the GED are generally considered to be between those of the high school graduates and of the terminal dropouts, GED holders appeared to be the most involved in using drugs of any group of young people.

Although differential acknowledgment of illegal drug behavior may partially account for these group differences, the finding of greatest involvement with drugs among those with a GED seems to be real. A comparison of lifetime reports of marijuana use obtained in the 1984 interview with self-administered reports of past-year marijuana involvement obtained in 1980 indicates that terminal dropouts were less likely to acknowledge their use of drugs than were those with GED certificates (Mensch and Kandel 1988). However, to assess differences among educational groups when differential underreporting would not be a factor, we asked Eric Wish, then at the New York State Division of Substance Abuse Services, to examine drug behavior as a function of dropout status among partici-

Table 2. Use of Selected Drugs, by Dropout Status in 1984 (ages 19–27), among Men

Percentage Using	Never a Dropout (percentage)	Ever a Dropout				Ratio: Dropout/ Never Dropout
		Total Dropouts (percentage)	High School Diploma (percentage)	GED (percentage)	No Diploma (percentage)	
Cigarettes						
Ever	80	92***	90	94	92	1.2
Last year	41	72***	59	72	74	1.8
1 or more packs per day in the past 30 days	33	57***	48	61	56	1.7
Alcohol						
Ever	97	97	99	99	96	1.0
Past 30 days	81	77***	87	78	76	1.0
Quantity and frequency in the past 30 days (0–6)	2.3	2.2	2.4	2.2	2.2	1.0
Marijuana						
Ever	67	77***	81	87	73	1.1
Last year	37	50***	46	53	49	1.4
100 or more times ever	20	36***	35	45	32	1.8
Cocaine						
Ever	21	27***	24	39	22	1.3
Last year	13	17***	18	21	16	1.3
40 or more times ever	24	36***	29	37	37	1.5
Other Illicit Drugs (excluding marijuana)						
Ever	31	42***	45	53	36	1.4
Last year	19	27***	34	29	25	1.4
40 or more times ever	10	19***	13	24	18	1.9
Total number	4,488	1,435	73	411	951	

*** Differences between ever and never dropout significant at $p<.001$.

Table 3. Use of Selected Drugs, by Dropout Status in 1984 (ages 19–27), among Women

Percentage Using	Never a Dropout (percentage)	Ever a Dropout				Ratio: Dropout/ Never Dropout
		Total Dropouts (percentage)	High School Diploma (percentage)	GED (percentage)	No Diploma (percentage)	
Cigarettes						
Ever	79	88***	78	90	88	1.1
Last year	43	70***	57	72	70	1.6
1 or more packs per day in the past 30 days	28	50***	34	56	48	1.8
Alcohol						
Ever	96	93***	93	96	93	1.0
Past 30 days	69	55***	60	57	54	.8
Quantity and frequency in the past 30 days (0–6)	1.4	1.1***	1.1	1.2	1.1	.8
Marijuana						
Ever	59	65***	63	76	61	1.1
Last year	26	30**	42	37	26	1.2
100 or more times ever	10	17***	19	22	15	1.7
Cocaine						
Ever	13	18***	19	28	13	1.4
Last year	9	9	11	13	7	1.0
40 or more times ever	19	30**	30	36	25	1.6
Other Illicit Drugs (excluding marijuana)						
Ever	25	33***	36	42	29	1.3
Last year	15	18**	20	22	16	1.2
40 or more times ever	7	13***	13	20	11	1.9
Total number	4,570	1,168	85	315	768	

*** Differences between ever and never dropout significant at $p<.001$.
** Differences between ever and never dropouts significant at $p<.01$.

pants in a study of arrestees in which self-reports of drug use were supplemented by urine tests. His findings, presented in a personal communication in 1986, supported those obtained in the NLSY. Drug use, as measured by urine samples, was highest among arrestees who passed the GED; terminal dropouts were indistinguishable from arrestees who had graduated from high school.

In general, the earlier the involvement in drug use and sexual activities, the higher the rates of dropping out (see Table 4). The more socially unacceptable the substance, the stronger the association with dropping out. The association was stronger for illicit drugs than for cigarettes or alcohol and stronger for illicit drugs other than marijuana than for marijuana. For example, 60 percent of the males who first used illicit drugs other than marijuana at age 12 or earlier dropped out, compared to 25 percent of those who started doing so after age 18. However, with the exception of cigarettes among males, those who never used a particular class of drugs were more likely to drop out of high school than were those who began to use them at age 19 or later.

Among females, early intercourse and pregnancy were very highly related to dropping out of school and were more likely to lead to dropping out than was early drug use. Thus, eleven times as many women (69 percent) dropped out of high school among those who reported having had their first intercourse at age 12 or below, compared to 6 percent among those who were still virgins at the time of the last interview, at ages 19–27.

Predicting Dropping Out: Event-History Analysis

To obtain estimates of the risk of dropping out of high school for subgroups of adolescents, controlling for various characteristics, we estimated event-history models. As was noted earlier, in estimating the models, two forms of the age variables for drug use—intercourse and pregnancy (for women)—were tested. Model 1 includes variables that measure whether initiation into each of the three behaviors took place prior to the risk of

Table 4. Prevalence of Dropout, by Age of Initiation of Various Activities, among Men and Women

Age of Initiation for Each Activity	Proportions Having ever Dropped Out among Those Who											
	Used Cigarettes		Used Alcohol		Used Marijuana		Used Other Illicit Drugs		Experienced Intercourse		Became Pregnant	
	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number
Men												
12 or less	35	2,099	46	245	55	312	60	78	48	499		
13–14	35	1,099	40	546	42	717	54	138	49	837		
15–16	33	1,006	33	1,730	34	1,176	47	379	35	1,873		
17–18	37	449	27	1,882	27	1,145	35	542	23	1,547		
19 or older	24	237	23	443	23	641	25	628	12	595		
Never[a]	16	955	31	209	26	1,814	29	4,012	9	483		
Women												
12 or less	30	1,308	37	95	55	107	42	24	69	55	60	10
13–14	30	1,238	38	323	42	521	49	117	60	321	70	143
15–16	25	1,222	29	1,221	34	1,019	38	320	44	1,438	65	641
17–18	21	587	20	1,974	27	944	29	367	20	2,025	41	909
19 or older	16	280	19	734	23	684	20	542	10	1,210	18	1,462
Never[a]	20	1,186	40	369	26	2,510	24	4,398	6	697	11	2,598

[a] By the time of the survey, at ages 19–27.

dropping out at specified ages. Model 2 includes specific ages of initiation for drug use, intercourse, and pregnancy. The values for these variables depend on age; those who never initiated or initiated at or after a specified dropout age (15, 16, 17, or 18) are given values equal to that specified dropout age.[5] The two models are complementary. The first determines whether prior use at any time, rather than how early the use began, is important in predicting dropping out. The second determines whether there is a linear association between the age of initiation and dropping out. Because the two variables are strongly negatively related for any particular behavior (correlations range from −.32 to −.65), significance for one usually implies significance for the other. By and large, those who first used a behavior prior to the risk of dropping out are early initiators.

Table 5 shows the determinants of the hazard of dropping out, estimated by the logit procedure. Ordinary least-squares (OLS) regression was performed for exploratory purposes to select variables for the logistic analysis. Explanatory variables that were significant in the OLS models were included, as were all drug variables except alcohol use prior to dropping out, which was not significant for either sex (see Table 5). (Thus, residence, region, and locus of control were excluded from the models.) The overall significance of each model is tested by calculating the log likelihood for the constant only model and comparing it to the log likelihood for a specified model. This likelihood ratio statistic is distributed as a chi-square with degrees of freedom equal to the number of parameters in the specified model. All models are significant at better than the .001 level.

Among the background variables, parental education and family intactness were strong predictors of dropping out for both sexes. The

[5] Given a negative association between age at first use and dropping out of high school, the inclusion of those who did not initiate one of the behaviors by the time of the survey and those who initiated it at or after a specified dropout age will underestimate the age-of-initiation effects. If, however, the effects of age of initiation were estimated only among all initiators who began their use before a specified dropout age, neither each activity (cigarette use, marijuana use, intercourse, and so forth) nor each dropout age could be included simultaneously in one model without restricting the analysis to that subset of the sample who initiated all activities prior to a specified dropout age. An alternative would be to analyze each activity in separate models for each age. However, this is not a satisfactory solution because there is no total effect and the size of coefficients for the covariates are inflated when their effects overlap. We estimated one model of the risk of dropping out at age 16 that was limited to initiators of marijuana use among men, with the set of background characteristics and age at first use of marijuana as covariates. The coefficient for marijuana use was nearly two times larger in the limited model than in the full model, which included all activities and all dropout ages. Clearly, marijuana use picked up the effect of the excluded drug and intercourse variables.

Table 5. Two Event-History Models Predicting the Probability of Dropping Out of High School among Men ($N = 5,939$) and Women ($N = 5,745$)

	Men			Women		
Predictors	Univariate Effects *b*	Model 1 *b*	Model 2 *b*	Univariate Effects *b*	Model 1 *b*	Model 2 *b*
Mother's education	−.085***	−.026	−.024	−.114***	−.071***	−.067***
missing	.485***	−.173	−.127	.588***	−.389*	−.412*
Father's education	−.075***	−.063***	−.063***	−.085***	−.063***	−.059***
missing	.482***	−.497**	−.458**	.527***	−.592***	−.522**
Race (versus white)						
Black	.026	−.894***	−.951***	.010	−1.159***	−1.120***
Hispanic	.487***	−.209	−.259*	.501***	−.325**	−.393***
Nonintact biological family at age 14 (versus intact)	.599***	.401***	.399***	.683***	.343***	.361***
1980 AFQT score	−.030***	−.032***	−.031***	−.037***	−.040***	−.040***
1980 low self-esteem	1.013***	.305**	.301**	1.179***	.311**	.308**
1980 delinquency (versus none)						
1–2	.173	.120	.166	.187*	.001	.057
3 or more	.442**	.244*	.320**	.534***	.228*	.270*
Dropout age (versus 15)						
16	.953***	.997***	1.354***	.285***	.314**	1.294***
17	1.253***	1.356***	2.080***	.551***	.491***	2.466***
18	1.056***	1.173***	2.190***	−.057	−.225	2.621***
Initiated each behavior prior to dropping out (versus did not)						
Cigarette use	.560***	.209*		.582***	.413***	
Marijuana use	.673***	.251**		.595***	.333**	
Other illicit drug use	.951***	.563***		.703***	.468**	
Intercourse	1.011***	.568***		1.213***	.793***	
Pregnancy	—	—		1.562***	.941***	
Age of Initiation (versus never did)						
Cigarette use	.161***		.009	−.720***		−.051**
Alcohol use	−.163***		−.061**	.189***		−.020
Missing information on alcohol use (versus not missing)	−.162		−.107	−.072		−.091
Marijuana use	−.192***		−.078***	−.195***		−.146***
Other illicit drug use	−.231***		−.092**	−.034		−.088
Intercourse	−.112***		−.100***	−.246***		−.282***
Pregnancy	—		—	−.145***		−.346***
Constant		−1.176	3.855		.365	14.532
p		.143	.143		.134	.134
Chi-square		1,019	977		1,124	1,001
df		18	20		19	21

* $p < .05$.
** $p < .01$.
*** $p < .001$.

greater the father's years of schooling, the less likely were the sons and daughters to drop out. Consistent with the finding that there is same-sex "role-modeling" in the educational attainment process (Rumberger 1983), maternal education was a significant predictor of dropping out only for females. Although the education coefficients were slightly smaller than those in the univariate models, they remained substantial, confirming that SES is important in predicting dropping out even when such fundamental variables as academic ability are controlled (Howell and Frese 1982b; Pallas 1984). For both sexes, those who did not live with both biological parents at age 14 were more likely to leave school without a diploma. Academic ability, as measured by the AFQT examination, was a consistently strong predictor, and its effect did not diminish with the addition of other variables. In common with other studies, we found that minorities were more

likely than whites to remain in school, once socioeconomic status and other predictors were taken into account. The coefficients for the age dummy variables were substantial; the probability of dropping out varied with age and was lowest at age 15 for males and at ages 15 and 18 for females.

Self-esteem had an extremely large effect at the univariate level; the lower a young person's self-esteem, the greater the propensity to dropout. That the effect was reduced markedly when other variables were controlled indicates that self-esteem captures much of the variation in other variables. Zero-order correlations indicated that self-esteem is strongly related to parental education and AFQT score.

Factors indicating participation in deviant activities were significant predictors of dropping out. Although limited involvement in delinquent acts did not significantly increase the probability of dropping out, more extensive delinquent involvement (three or more acts within the past year) did. For males, both intercourse variables were significant. Not only did prior sexual experience increase the risk of dropping out, but the earlier the first experience, the greater the risk. Among females, consistent with the findings of other researchers that early childbearing is detrimental to the completion of high school (Barro and Kolstad 1987; Howell and Frese 1982a, 1982b; Mott and Marsiglio 1985; Pallas 1984; Rumberger 1983), we found that the pregnancy variables were strongly related to dropping out. The intercourse variables remained significant in the presence of the pregnancy variables.

Drug use had a substantial impact on early school leaving, with the effects varying somewhat among men and women. For men, the stronger the sanctions against the drug, the greater its impact. Illicit drugs other than marijuana had the largest effect, followed in importance by marijuana. Prior use, especially if initiated at an early age, increased the probability of premature school leaving. The effects of the legal substances were somewhat smaller. Prior alcohol use was excluded from the analysis because it was not significant for either sex in the OLS regressions, which suggests that experience with alcohol by the early teenage years is so pervasive that use per se does not differentiate dropouts from graduates. However, age at which drinking began was predictive of dropping out. For cigarettes, by contrast, any prior use was important, while earliness of use was irrelevant.

For women, cigarettes, both prior use and age of initiation, were much more important than for men, which suggests that involvement with cigarettes has greater social implications for teenage girls than for teenage boys. In contrast to the usage by men, the use of marijuana by women had a greater impact on dropping out than did involvement with other illicit drugs. Any prior use of other illicit drugs was significant, while the age of initiation was not, perhaps because there may be little variation in the timing of first use among those women who used illicit drugs other than marijuana before dropping out. Indeed, the standard deviation for the age of initiation into other illicit drugs among females who used these drugs prior to dropping out was 1.3 years—considerably lower than the 2.2 years for males.

Because certain potentially time-varying variables (AFQT, self-esteem, and delinquency) were measured at only one point in time in 1980 and could have been measured after rather than before the respondents dropped out, analyses were performed to ascertain whether determinants and consequences might be confounded in some cases. A subgroup of dropouts in the NLSY left school after 1980, namely, members of the 1964 birth cohort who dropped out at ages 16, 17, or 18. Event-history models were run on this restricted sample. We found that the effect of self-esteem became unimportant for both sexes, that of the AFQT score remained virtually the same for men but increased for women, and that of delinquency increased in magnitude but became insignificant for men while it increased substantially for women (data not presented). These findings suggest that, for both sexes, a respondent's self-image was influenced by having dropped out of school, rather than the opposite, while the reverse was true for ability and delinquency, especially for women: low ability and delinquency led to dropping out of school. However, because this age- and cohort-restricted sample included only 14 percent of all dropouts and may not be representative of the population of dropouts as a whole, these conclusions are tentative.

Since logit coefficients have no intuitive interpretation, the predicted changes in the probability of dropping out in any one year

Table 6. Estimated Changes in the Drop-out Rate during a Year Resulting from a One Standard-Deviation Change in Predictor Variables among Men and Women[a]

Predictors	Model 1		Model 2	
	Men (percentage)	Women (percentage)	Men (percentage)	Women (percentage)
Mother's education	−1.3[b]	−3.2	−1.2[b]	−3.0
Father's education	−4.1	−3.8	−4.1	−3.6
Race (versus white)				
Black	−4.2	−4.7	−4.4	−4.6
Hispanic	−0.9[b]	−1.3	−1.1	−1.6
Nonintact biological family at age 14 (versus intact)	2.5	2.0	2.4	2.1
1980 AFQT score	−9.0	−9.9	−8.7	−9.9
1980 low self-esteem	1.5	1.5	1.5	1.5
1980 delinquency (versus none)				
1–2	0.7[b]	0.0[b]	1.0[b]	0.3[b]
3 or more	1.5	1.1	2.1	1.3
Initiated each behavior prior to dropping out (versus did not)				
Cigarette use	1.2	2.6		
Marijuana use	1.5	1.7		
Other illicit drug use	2.0	1.4		
Intercourse	3.8	4.2		
Pregnancy	—	3.3		
Age of Initiation (versus never did)				
Alcohol use			−1.2	−0.3[b]
Cigarette use			0.3[b]	−1.6
Marijuana use			−1.7	−2.3
Other illicit drug use			−1.5	−1.2[b]
Intercourse			−2.4	−3.9
Pregnancy			—	−4.6

[a] All significant at $p < .05$, except when indicated.
[b] Not significant.

resulting from a one standard deviation change in each of the predictor variables were calculated and are displayed in Table 6. These standardized partial derivatives give the relative net effect of each of the predictors and enables comparisons to be made across variables.[6] It is apparent that the AFQT score had a much greater impact on dropping out than did any other variable and that being black was next in importance. Nonetheless, the effects of the drug variables were not inconsiderable. A one standard deviation increase in age of marijuana initiation lowered the probability of dropping out in any one year by 1.7 percent for men and 2.3 percent for women. For the dummy variable marijuana predictor, which indicates whether initiation took place prior to dropping out, the standardized partial derivative indicates that men and women who became involved with

[6] This procedure was used by Pallas (1984), although a slightly different calculation that is suitable for categorical explanatory variables was used here in our study. The formula is

$$\begin{aligned}\delta P/\delta x_i &= P(D=1 \mid L_1) \\ &\quad - P(D=1 \mid L_0), \\ &= \exp(L_1)/ \\ &\quad [1+\exp(L_1)] - P,\end{aligned}$$

where $L_0 = \text{Log}[P/(1-P)]$, the logit of the odds-ratio at the sample mean, before the change in x_i, and $L_1 = L_0 + \beta_i\sigma_i$, the logit after the change in x_i (Petersen 1985). The formula for a continuous explanatory variable is

$$P/x_i = \beta_i\sigma_i P(1-P).$$

The standard procedure is to evaluate the change in the probability at the sample mean of the dependent variable. The closer the mean probability is to .5, the greater the value of the partial derivative. The probability of dropping out in the person-year sample constructed for the event-history analysis is lower than the probability in the standard sample because in the former, each nondropout is guaranteed to have a record for each year, whereas each dropout only contributes a record until the time of dropping out. The person-year sample mean is .14 for men and .13 for women and the estimated partial derivatives are correspondingly low. However, the partial derivatives give the effect for a person year, not a person.

Because a linear probability model is estimated when OLS regression is performed with a dummy dependent variable, the predicted probabilities generated from the logistic coefficients are comparable to OLS coefficients for a hazard model.

marijuana were, respectively, 1.5 percent and 1.7 percent more likely to drop out in any one year than were those who did not use marijuana. Thus, the effect of the most-important-drug variable, marijuana for men and cigarettes for women, was over one-fifth that of the AFQT, the strongest predictor of dropping out and comparable to that of the intactness of the family at age 14.

Predicting the Acquisition of a GED among Dropouts

The cross-sectional data presented earlier indicate that the high school dropouts who earned a GED were the heaviest drug users. Whether the relationship remains once potential confounding factors are controlled and the timing of events is taken into account was investigated with event-history analysis. The dependent event is obtaining a GED in the risk set composed of high school dropouts ($N = 1,820$ men, 1,471 women). The analysis was limited to ages 17–22 because fewer than 5 percent of those who had a GED by 1984 were aged 23–27 when they acquired the credential.

OLS regression, performed to select variables, indicated that few explanatory variables were significant, in part because the risk of taking the GED examination in any one year was small. However, OLS is not a desirable estimation procedure when the probability of occurrence of the dependent event approaches 1 or 0, as it did here, since the relationship between the underlying probability and the independent variables is not linear in the extremes of the range. Thus, variables were selected for the final models because they were significant in the OLS models, had large univariate effects, or were of theoretical interest (see Table 7).

The estimated coefficients for the univariate and multivariate event-history models are reported in Table 7. The two most important variables were AFQT score and parental education (mother's education for females and father's education for males). As was observed in the dropout model, the AFQT score was the only variable whose value in the multivariate model was virtually unchanged from that in the univariate model; academic ability had a strong direct effect on the probability of obtaining a GED. For women, two other variables were significant: self-esteem and race. The lower her self-esteem, the less likely a woman was to receive a GED. As in the dropout models, once academic ability and parental education were taken into account, blacks and Hispanics were more likely than were whites to obtain a GED. Neither marijuana use nor the use of other illicit drugs was significant in the multivariate models once other predictors were controlled.

The correlations between AFQT score and various measures of illicit drug use among dropouts were sufficiently high and positive (ranging from .20 to .35) to account at least partially for the elimination of the drug effects in the multivariate model. Among dropouts, drug users had considerably higher scores than did nonusers on the AFQT; users of marijuana scored 11.5 points *higher* ($X = 56.8$) and users of other illicit drugs scored 11.4 points higher ($X = 60.7$) than did nonusers on a test in which the average score among dropouts was 53.6 ($SD = 18.3$) and among graduates 75.9 ($SD = 20.3$). High school graduates who used marijuana scored, on average, 4.1 points higher ($X = 77.4$) and those who used other illicit drugs scored 5.1 points higher ($X = 79.6$) than did nonusers—differences that are considerably smaller than those observed among dropouts. The exclusion of the AFQT score from Model 1 led to an increase in the effect of the drug variables; the marijuana coefficient became positive and significant for men at the .05 level and the other illicit drugs coefficient, although not significant, became positive. For women, the marijuana coefficient quadrupled in size and the other illicit drugs coefficient doubled and was significant at the .07 level. The increase in the size of the drug coefficients when the AFQT score is excluded from the equations is further evidence that the AFQT score picked up some of the effects of the drug variables.

CONCLUSION

In this national sample of young men and women aged 19–27, the lifetime prevalence estimate of dropping out of high school, defined as having left high school at some point in one's educational career, is 22.3 percent. This rate is lower than the national attrition of 27.9 percent (Price 1982) and the on-time graduation rate of 28.2 percent in 1981–82, calculated by the NCES (Grant and Snyder 1983), probably because full educational histories were not obtained for the older

Table 7. Event-History Models Predicting the Probability that a High School Dropout Obtains a GED Certificate among Men ($N = 1,439$) and Women ($N = 1,170$)

	Men			Women		
Predictors	Univariate Effects *b*	Model 1 *b*	Model 2 *b*	Univariate Effects *b*	Model 1 *b*	Model 2 *b*
Mother's education	.112***	−.024	−.023	.154***	.119***	.121***
missing	−.823***	−.751	−.734	−.727*	.371	.383
Father's education	.075***	.086**	.084**	.062***	−.009	−.011
missing	−.216	1.075***	1.046**	−.199	.064	.001
Race						
Black (versus white)	−.435**	.318	.360	−.510**	.577**	.552*
Hispanic	−.590**	.195	.198	−.437*	.538*	.555*
1980 AFQT score	.049***	.047***	.047**	.049***	.046***	.045***
1980 low self-esteem	−1.088***	−.314	−.323	−1.103***	−.554**	−.576**
1979 locus of control (1 = very internal, 4 = very external)	−.446***	−.041	−.035	−1.103*** −.477***	−.172	−.185
1980 delinquency						
1–2 (versus none)	.416*	.229	.205	.054	−.245	−.241
3 or more	.638***	.362	.332	.155	−.042	−.020
Initiated each behavior prior to dropping out (versus did not)						
Marijuana use	.620***	.255		.697***	.049	
Other illicit drug use	.514***	−.099		.812***	.180	
Pregnancy	—	—	—	−.433**	−.296	
Age of initiation (versus never did)						
Marijuana use	−.091***		−.032	−.154***		−.039
Other illicit drug use	−.096***		−.006	−.173***		−.034
Pregnancy				.001		−.002
Constant		−5.916	−5.090		−5.103	−3.809
p		.057	.057		.049	.049
Chi-square		249	249		195	194
df		13	13		14	14

* $p < .05$.
** $p < .01$.
*** $p < .001$.

cohorts in the NLSY. The estimate, however, is higher than the rates of 14.9 percent from the census in 1984 (U.S. Bureau of the Census 1985) and of 13.9 percent from the NCES survey (High School and Beyond) (NCES 1984; Plisko and Stern 1985), probably because the sample has been questioned annually for six years, not just once or twice; dropouts from all grades were captured, not just those in the tenth and eleventh grades; and individuals with GEDs were considered dropouts. Indeed, one-third of those who dropped out eventually obtained a credential, most frequently a GED. If these individuals were to be considered high school graduates, the dropout rate in the NLSY sample would be reduced to 14.8 percent.

Dropouts reported significantly higher rates of use of all classes of drugs than did regular students, which supports the assessment that the epidemiological data on rates of drug consumption provided annually for the nation's high school seniors in Monitoring the Future (Johnston, O'Malley, and Bachman, 1986) are underestimates because of the omission of school dropouts and absentees in the data base (Clayton and Voss 1982; Johnston, O'Malley, and Bachman 1986).

The risk factors for dropping out identified in this cohort confirm findings reported by others but also highlight the importance of individual characteristics that hitherto were neglected. The study also advances our understanding of those young people who leave high school but go on to obtain a GED—a group about whom little is known.

The most important contribution of this study is the documentation of the impact of involvement in drugs as an additional and unique contributor to early school leaving,

controlling for other factors that are known to be important risk factors for the interruption of schooling. Indeed, event-history analysis, which specifies the dynamic relationship between the use of drugs and dropping out, indicates that the prior use of cigarettes, marijuana, and other illicit drugs at any age increases the propensity of both sexes to drop out. In addition, the younger the initiation into alcohol, marijuana, and other illicit drugs for men, and cigarettes and marijuana for women, the greater the likelihood of leaving school without a diploma. Since various factors that could determine both drug use and dropping out of school were controlled for in multivariate analyses, the results lead to the conclusion that dropping out is a partial function of drug use itself.

We can speculate about the mechanisms and processes that underlie the observed effect of drug use on dropping out of school. As was mentioned earlier, according to problem behavior theory (Jessor and Jessor 1977), drug use, as another manifestation of problem behavior, may reflect an underlying desire by a young person to assume adult status and abandon such activities as schoolwork that are perceived as not being a part of that status. From a slightly different perspective, involvement in drugs may reflect a failure in socialization, which is manifested by the lack of attachment to conventional social institutions such as the schools. The involvement in drugs, which results from association with other drug-using youths and in response to peer pressure, may also reinforce continued participation in such networks (Elliott, Huizinga, and Ageton 1985; Kandel 1978). In turn, membership in deviant networks may reinforce nonconforming values and may create pressures to engage in deviant activities other than drug use, such as a disinterest in academic matters and truancy, which, in turn, lead to dropping out of school. Drug use, because of its physiological effects, may also impair cognitive functioning and motivation and, in this way, foster a lack of commitment to school and dropping out.

Each of the three classes of individual factors highlighted by Pallas (1984)—academic performance, social disability, and accelerated role transitions—is important in determining who drops out of high school. The most crucial predictor is academic ability, although socioeconomic factors and family structure are important as well. Students from nonintact families and those from families with lower levels of education have higher risks of not completing high school than do their classmates. There is a same-sex role-modeling factor previously identified by Rumberger (1983): females are more influenced by the educational levels of their mothers and males by the educational level of their fathers. When socioeconomic factors and ability are controlled, blacks and Hispanics have higher retention rates than do whites. The strong negative impact of pregnancy on school completion also was confirmed in our data. As others have suggested (Furstenberg 1976), students who become pregnant may be lower achievers, school systems may not be set up to accommodate pregnant adolescents, or the pressures of child care may interfere with schoolwork. Early intercourse retains its significant effect even after pregnancy is controlled for, which suggests that the time spent in interactions with peers of the opposite sex may be at the expense of schoolwork. In addition, both for male and female adolescents, extensive sexual experiences may represent, as Pallas (1984) suggested for dating behavior, a breaking away from parental authority, a concomitant search for independence, and a rejection of a commitment to school.

Our analyses may elucidate the sometimes conflicting results obtained by others regarding the effects of psychological variables, such as self-esteem and locus of control. The strong univariate effects of these variables disappeared in the multivariate models. The correlation matrix indicates that these two variables are related to both the parents' educational levels and to the respondents' mental ability. Once these two strong factors are controlled for, self-esteem and locus of control lose their effects.

Among dropouts, those who go on to obtain a GED are the most deviant and most likely to use drugs. Since they also score higher in academic ability tests than do terminal dropouts, dropouts who acquire a GED may have left school not because they were incapable of doing academic work but because their lifestyles were incompatible with scholastic success. Their drug use is symptomatic of their rejection of conventional adult values. Initiated in 1942, the GED testing program was originally intended for returning World War II veterans who had

interrupted their high school education (Malizio and Whitney 1981). Over time, the characteristics of those taking the GED examination and their reasons for taking it have changed markedly. It has been suggested that high schools are now using the examination to expel their more troublesome students (Smith 1983), an interpretation supported by the data presented here. Additional support for the notion is provided by the fact that some states lowered both the age for school leaving and the minimum age requirement for taking the GED (Lent 1977), although some states are now considering raising the minimum age for school leaving; the mean age of GED test takers fell considerably, from 29.5 years in 1967 to 25.8 years in 1984 (GED Testing Service, 1984), with nearly one-third of the test takers under age 20. However, event-history analysis indicates that once parental education and academic ability are controlled, the usage of marijuana and other illicit drugs does not determine who among the dropouts acquires an equivalency certificate.

The data reported in this article provide striking documentation of the fact that participation in a variety of activities in adolescence that are deviant because they contravene general societal norms, such as delinquency or the use of marijuana and other illicit drugs, or because they contravene age-related norms for adolescents, such as sexual intercourse, pregnancy, or cigarette smoking, greatly increase the risk of dropping out of school. Furthermore, the earlier the initiation into each of these behaviors, including alcohol, the greater the risk of school leaving. However, the data also document that each behavior creates unique risks of its own. In particular, the role of drug involvement in early school leaving illustrates that participation in one class of deviant activities by itself, over and beyond the initial differences among young people that lead some of them to engage in these deviant activities, increases the risk of participation in other deviant behaviors and reduces the commitment to conventional institutions, one of which is the school.

The results have important implications regarding intervention strategies designed to reduce school drop out, an issue of increasing national concern. We would suggest that the prevention of drug use, or at least delaying its onset, will increase the probability of high school graduation. Indeed, whatever common predisposing factors may foster participation in both behaviors, drug use has unique effects of its own in increasing the risk of leaving school.

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